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10/655,075	09/04/2003	Man-Ho Lawrence Lee	200209141-1	5841

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EXAMINER

ZHE, MENG YAO

ART UNIT	PAPER NUMBER
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2109

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/18/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/655,075	Applicant(s) LEE, MAN-HO LAWRENCE	
	Examiner MengYao Zhe	Art Unit 2109	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 to 30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 to 30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This is the initial Office Action based on the 10/655075 application filed on September 4, 2003.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims(s) **22 to 30** are directed to resource allocation.

This claimed subject matter lacks a practical application of a judicial exception (law of nature, abstract idea, naturally occurring phenomenon) since it fails to produce a useful, concrete and tangible result.

Claims 22 to 30 lack necessary physical articles or objects to constitute a machine or a manufacture within the meaning of 35 USC 101. They are clearly not a series of steps or acts to be a process nor are they a combination of chemical compounds to be a composition of matter. As such, they fail to fall within a statutory category. They are, at best, functional descriptive material *per se*.

Descriptive material can be characterized as either "functional descriptive material" or "non-functional descriptive material." Both types of "descriptive material" are non-statutory when claimed as descriptive material *per se*, 33 F.3d at 1360, 31 USPQ2d at

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1759. When functional descriptive material is recorded on some computer-readable medium, it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare *In re Lowry*, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994)

Merely claiming non-functional descriptive material, i.e., abstract ideas, stored on a computer-readable medium, in a computer, or on an electromagnetic carrier signal, does not make it statutory. See *Diehr*, 450 U.S. at 185-86, 209 USPQ at 8 (noting that the claims for an algorithm in *Benson* were unpatentable as abstract ideas because "[t]he sole practical application of the algorithm was in connection with the programming of a general purpose computer.").

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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Claims 1, 3, 5, 6, 8, 9, 15, 20, 22, and 29 are rejected under 35 U.S.C. 102(e) as being anticipated by Eilam et al., Publication No. US2004/0111509 (hereafter Eilam).

As per **claim 1**, Eilam teaches **a method for dynamic load balancing resource allocation, comprising:**

receiving a desired allocation of resources for servicing a plurality of consumer groups requests; (*Eilam teaches a variable NEEDED. It indicates the amount of resources needed by the client. This is the equivalent of a desired allocation. Paragraph 25 and 95.*)

determining an actual allocation of the resources for a present operational period; (*Eilam teaches a Resource Control Algorithm that uses a RAP table to determine the actual allocation amount granted for a client. This determination is made based on past data and future predictions.*)

determining a temporary allocation of the resources for a next operational period relative to the desired allocation and the actual allocation; (*Eilam teaches STF, Short Term Forecast, which predicts the future workload based on LTF, which is dependent on load metrics including arrival rate of requests, which is the equivalent of desired allocation. STF is also dependent on current residuals, which is the equivalent of the actual allocation. Paragraphs 34, 35 to 37, and 85 to 86*)

allocating the resources to the consumer group requests in the next operational period according to the temporary allocation; and *(All the allocations are based STF and LTF. Paragraph 87)*

selecting consumer group requests to be serviced by the resources based upon availability of the consumer groups requests and the amount of consumer groups requests being presently serviced . *(the system disclosed by Eilam keeps track the number of available servers, $N(i)$. Paragraph 34)*

As per **claim 20**, it claims for a computer readable medium embodying a computer program, which contains all the instructions capable of performing the method steps of claim 1. Since claim 1 is rejected, claim 20 is rejected as well.

As per **claim 22**, it claims for a system that contains all the components capable of performing the method steps of claim 1. Since claim 1 is rejected, claim 22 is rejected as well.

As per **claim 29**, it claims for a system that contains all the logical components capable of performing the method steps of claim 1. Since claim 1 is rejected, claim 29 is rejected as well.

As per **claim 3**, Eilam teaches

wherein the actual resource allocation of consumer group requests is expressed in terms of a weight factor or in terms of a percentage.

(Paragraph 36, 45: The RAP contains a resource allocation plan, which is based on LTF, with equations given in paragraph 36 that contains $W1...Wm$ that are weights used for resource allocation.)

As per **claim 5**, Eilam teaches

Wherein the actual resource allocation is defined in terms of decay function of a factored sum of a measured current resource allocation percentage and an actual resource allocation value from a previous operations period *(Paragraph 85: All actual allocation decision is based on the sum of $X(t)$ and $X(t-1)$, which are the actual current and past LTF residuals. This is the equivalent of the teachings of claim 5.)*

As per **claim 6**, Eilam teaches

Wherein the operational period is self-clocking or is a fixed time period.

(Paragraph 32: it is inherent in the teachings of Eilam that the time slot, which is the equivalent of the operational period, is a self clocking, meaning that the system itself automatically tracks the time for each customer.)

As per **claim 8**, Eilam teaches

Wherein the temporary allocation is expressed in terms of a requested resource allocation percentage, a rate of decay and an actual resource allocation percentage from a previous time period . (Paragraph 36 and 85: LTF and STF are both predictors for the future resource requests, and all are dependent on previous values and rate of decay included $A_0 \dots A_0$ and $W_0 \dots W_m$.)

As per **claim 9**, Eilam teaches

Wherein a priority for allocating the resources in the next operational period is determined using a weighted round robin scheme based on the temporary resource allocation percentage. (Paragraph 87: priorities are given to clients. Therefore it is inherent that those priorities are used for a weighted round robin scheme so that the customer with the highest priority gets serviced first.)

As per **claim 15**, Eilam teaches

Wherein restrictions are applied to servicing the consumer requests (Paragraph 11: the invention is used for server farms servicing customers.)

Claim Rejections - 35 USC § 103

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 2, 16 to 18, 21, 23 to 28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eilam et al., Publication No. US2004/0111509 (hereafter Eilam) in view of Durinovic-Johri et al., Publication No. US2002/0176363 (hereafter Durinovic-Johri).

Eilam teaches all of claim 1 and

Claim 2: calculating a consumer load for each consumer group in response to the number of consumer groups requests being serviced, wherein each consumer group request is associated with a consumer group; (The

consumer load is the equivalent of Mt , as disclosed by Eilam, which is the current load of a request. Paragraph 22)

Claim 16: Wherein the calculation of the consumer group load for each group in a given operational period is based on a decay function of measured incoming request rate. (Paragraph 85: All actual allocation decision is based on the sum of $X(t)$ and $X(t-1)$, which are the actual current and past LTF residuals, describing request loads.)

Claim 17: wherein the measured incoming request rate is based on the ratio of the requests processed over the given operational period for a particular resource (Paragraph 34: It is inherent is the teaching of Eilam that the arrival rate of requests $AR(i)$, which is the equivalent of incoming request rate, is the ratio of request processed over the operational time period. The definition of rate is amount over a period of time.)

Eilam does not teach

Claim 2, 16, 17: calculating a busyness factor for each resource in response to the number of requests being serviced; and selecting the least busy resource to service the consumer group requests based on the consumer load and the busyness factor.

Claim 18: wherein the busyness factor for a particular resource is based on a sum of all consumer loads on the particular resource.

However, Durinovic-Johri teaches

Claim 2, 16, 17: calculating a busyness factor for each resource in response to the number of requests being serviced; and selecting the least busy resource to service the consumer group requests based on the consumer load and the busyness factor for the purpose of dynamically managing the load of each resource and efficiently handling all requests.

(Durinovic-Johri, Paragraph 34: The system disclosed is capable of keeping track of the load on each router, which is the equivalent of a resource, and pick out the router that is least busy, or the least congested.)

Claim 18: wherein the busyness factor for a particular resource is based on a sum of all consumer loads on the particular resource for the purpose of correctly monitoring the load on each resource. *(Paragraph 34: It is inherent in the teachings of Durinovic-Johri that the load on each router is the total consumer load on it at the time.)*

It would have been obvious to one having ordinary skill in the art at the time of the applicant's invention to have modified the invention of Eilam with

Claim 2, 16, 17: calculating a busyness factor for each resource in response to the number of requests being serviced; and selecting the least busy resource to service the consumer group requests based on the consumer load and the busyness factor, as taught by Durinovic-Johri, because it allows for dynamically managing the load of each resource and efficiently handling all requests.

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Claim 18: wherein the busyness factor for a particular resource is based on a sum of all consumer loads on the particular resource, as taught by Durinovic-Johri, because it allows for correctly monitoring the load on each resource.

As per **claim 21**, it claims for a computer readable medium with a computer program that contains all the instructions capable of performing the method steps of claim 2. Since claim 2 is rejected, claim 21 is rejected as well.

As per **claim 23**, it claims for a system that contains all the components capable of performing the method steps of claim 2. Since claim 2 is rejected, claim 23 is rejected as well.

As per **claim 24**, Eilam teaches

wherein the request arbitrator is further configured with means for keeping track of binding between consumer groups and resources. (Paragraph 30: the system keeps track of what resources are guaranteed to the consumer and what resources could be possibly used for the consumer. This is the equivalent of binding.)

As per **claim 25**, Eilam teaches

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Wherein the request arbitrator is further configured with means for matching consumer group request for a particular resource and its request queue. *(Paragraph 30: it is inherent in the teaching that, since some resources are always guaranteed to the consumer, they will have a waiting queue for consumers who need them.)*

As per **claim 26**, Eilam teaches

Wherein the request arbitrator is configured for being interrupt driven. *(Paragraph 20: It is inherent in the teaching that since the system is capable of receiving requests, it must be notified of incoming requests, which is a form of interrupt.)*

As per **claim 27**, Eilam teaches

Wherein the request arbitrator is further configured with means for detecting a completing interrupt and means, responsive to the completion interrupt, for identifying consumer groups requests having a particular binding and queuing them onto a request servicing queue. *(Paragraphs 20 and 30; Moreover, this claims merely recites sub-steps that are necessary to perform request allocation. This is all taught inherently in the teachings of Eilam.)*

As per **claim 28**, Eilam teaches

Wherein the request arbitrator is further configured with means for breaking an existing binding between a consumer group and the resource

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and for establishing a new binding. (*Paragraph 34: The resource manager and allocate or de-allocate, which is the equivalent of breaking a binding and making a new binding.*)

As per **claim 30**, it claims for a system that contains all the logical components capable of performing the method steps of claim 2. Since claim 2 is rejected, claim 30 is rejected as well.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eilam et al., Publication No. US2004/0111509 (hereafter Eilam) in view of Durinovic-Johri et al., Publication No. US2002/0176363 (hereafter Durinovic-Johri), and further in view of Liu et al., Patent No. 5,031,089 (hereafter Liu).

As per claim 19, Eilam, in view of Durinovic-Johri, teaches claim 2.

Eilam, in view of Durinovic-Johri, does not teach

wherein each consumer group load is defined, for a given operational period, as a ratio of incoming consumer group requests divided by the serviced requests for a particular resource.

However, Liu teaches

wherein each consumer group load is defined, for a given operational period, as a ratio of incoming consumer group requests divided by the serviced requests for a particular resource for the purpose of having a way to

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calculate the workload (*Last paragraph of Column 8 and first 10 lines of column 9: The work load at each node is defined as Q/H , where Q is the queue length, which is the equivalent of incoming consumer group requests, H is the service rate, which is the equivalent of serviced requests.*)

It would have been obvious to one having ordinary skill in the art at the time of the applicant's invention to have modified the invention of Eilam, in view of Durinovic-Johri, with the specifics of

wherein each consumer group load is defined, for a given operational period, as a ratio of incoming consumer group requests divided by the serviced requests for a particular resource,

as taught by Liu, for the purpose of having a way to calculate the workload.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eilam et al., Publication No. US2004/0111509 (hereafter Eilam) in view of Kawamoto et al., Publication No. US2003/0097393 (hereafter Kawamoto).

As per **claim 4**, Eilam teaches all of claim 1.

Eilam does not teach

normalizing a sum of all resource allocations to one.

However, Kawamoto teaches

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normalizing a sum of all resource allocations to one for the purpose of having a simpler, more efficient way of representing and manipulating with load amount. (*Kawamoto Paragraph 84*)

It would have been obvious to one having ordinary skill in the art at the time of the applicant's invention to have modified the invention of Eilam with

normalizing a sum of all resource allocations to one, as taught by Kawamoto, because it allows for a simpler, more efficient way of representing and manipulating with load amount.

Claims 7 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eilam et al., Publication No. US2004/0111509 (hereafter Eilam) in view of Jiang et al., Patent No. 6,535,742 (hereafter Jiang).

Eilam teaches all of claim 1.

Eilam does not teach

Claim 7: wherein the next operational period is adjusted inversely to a number of consumer group requests

Claim 14: the next operational period is shortened to minimize effects of an accumulated skewed request pattern

However, Jiang teaches

Claim 7: wherein the next operational period is adjusted inversely to a number of consumer group requests for the purpose of taking in more

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requests during quickly changing traffic periods. (*Column 4 lines 1 to 23: the period T may be reduced so that more samples can be taken.*)

Claim 14: the next operational period is shortened for the purpose of taking in more requests during quickly changing traffic periods. (*Column 4 lines 1 to 23*)

It would have been obvious to one having ordinary skill in the art at the time of the applicant's invention to have modified the invention of Eilam with

Claim 7: wherein the next operational period is adjusted inversely to a number of consumer group requests,

Claim 14: the next operational period is shortened

as taught by Jiang, because it allows a system to take in more requests during quickly changing traffic periods.

Claims 10 to 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eilam et al., Publication No. US2004/0111509 (hereafter Eilam) in view of Fong et al., Patent No. 6,263,359 (hereafter Fong).

Eilam teaches all of claim 9 and

Claim 10: A weighted round robin scheme involving comparison of a weighted sum of serviced request for each consumer. (*Paragraph 87: the revenue expectation weights are used to assign priorities.*)

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Claim 12: wherein the weighted sum comparison is made only among consumer groups with active requests outstanding. (Paragraph 32: All requests are active and waiting to be assigned an allocation.)

Eilam does not teach

Claim 10, 12: each consumer group request is associated with a consumer group.

Claim 11: the consumer group with the lowest weighted sum is given the highest priority.

Claim 13: a decay function is used with the weighted sum for the purpose of better scheduling a waiting task. (Column 10, Lines 25 to 30: please see the equation.)

However, Fong teaches

Claim 10, 12: each consumer group request is associated with a consumer group for the purpose of efficiency in managing and classifying requesters having the same performance objectives. (Column 2, lines 1 to 5)

Claim 11: the consumer group with the lowest weighted sum is given the highest priority for the purpose of serving the task group that needs to be served the most. (Column 2, lines 35 to 41 and Column 10, lines 25 to 31: Fong discloses a system that chooses the minimum value among the time function values for a group of tasks as the job class that gets to be scheduled first. The time function value has a weight factor that is determined by the response time objective.)

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It would have been obvious to one having ordinary skill in the art at the time of the applicant's invention to have modified the invention of Eilam with

Claim 10, 12: each consumer group request is associated with a consumer group, as taught by Fong, because it allows for efficiency in managing and classifying requesters having the same performance objectives

Claim 11: the consumer group with the lowest weighted sum is given the highest priority , as taught by Fong, because it allows the system to serve the task group that needs to be served the most.

Claim 13: a decay function is used with the weighted sum because it allows for better scheduling of a waiting task.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MengYao Zhe whose telephone number is 571-272-6946. The examiner can normally be reached on Monday Through Friday, 7:30 - 5:00 EST .

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Del Sole can be reached on 571-272-1130. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

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system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

M.Z.


KIMBERLY D. NGUYEN
PRIMARY EXAMINER